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10/598,285

06/21/2007

Gerold Gruendler

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EXAMINER

HOFFBERG, ROBERT JOSEPH

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/598,285	<b>Applicant(s)</b> GRUENDLER ET AL.	
	<b>Examiner</b> ROBERT J. HOFFBERG	<b>Art Unit</b> 2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 10-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/23/06</u> .   | 6) <input type="checkbox"/> Other: _____                          |

***Detailed Action***

***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, “cooling fins (claims 11, 19 and 28), a “cooling air stream device” (claims 15-16 and 23-24), “two cooling plates which are opposite one another and which are arranged in a pivotable manner on a plug-in strip” (examiner note: requires two pivotable cooling plates on a plug-in contact strip) (claims 17 and 25), means for “a device generating a cooling air stream” (claim 26) and means for “the cooling air stream during operation of the power semiconductor components in the event of a critical temperature of the power semiconductor components being reached” (claim 26) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

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application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

3. Claims 14 and 23 are objected to because of the following informalities: "L" is the reference character for the cooling air stream. All the other reference numerals or characters have been removed from the claims. If the applicant desires include the reference numeral in the claims, it should be enclosed with parentheses. MPEP 608.01(m). Appropriate correction is required.

4. Claims 16 and 24 are objected to because of the following informalities: "into which forced cooling project cooling grid structures connected to the cooling plate" appears to be a bad translation. Examiner understands this to mean "into which with cooling grid structures connected to the cooling plate projects." Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 10-11, 18-19 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087).

With respect to Claim 10, Frankeny et al. teach a cooling system for devices comprising power semiconductor components (24), the power semiconductor components being arranged on a printed circuit board (25) arranged in a plug-in contact strip (12) of a superordinate circuit carrier (14), the cooling system comprising: a cooling plate (10), which is mounted in a pivotable manner (Col. 1, line 68) on the plug-in contact strip in a region (see Fig. 3) of one of the power semiconductor components, and which can be pivoted about an axis (38 runs parallel to 12) parallel to the plug-in contact strip, the cooling plate having a first mounting and maintenance position (Fig. 3, shown in phantom) pivoted away from the power semiconductor component, and a second cooling and operating position (Fig. 3, as shown) pressed onto the power semiconductor component. Frankeny et al. fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

With respect to Claim 18, Frankeny et al. teach a power semiconductor device having a cooling system comprising: one or more power semiconductor components (24), the power semiconductor components being arranged on a printed circuit board (25) arranged in plug-in contact strip (12) of a superordinate circuit carrier (14); a cooling plate (10), which is mounted in a pivotable manner (Col. 1, line 68) on the plug-

in contact strip in a region (see Fig. 3) of one of the power semiconductor components, and configured to be pivoted about an axis (38 runs parallel to 12) parallel to the plug-in contact strip, the cooling plate having a first mounting and maintenance position (Fig. 3, shown in phantom) pivoted away from the power semiconductor component, and a second cooling and operating position (Fig. 3, as shown) pressed onto the power semiconductor component. Frankeny et al. fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

With respect to Claim 27, Frankeny et al. teach a cooling system for devices comprising power semiconductor components (24), the power semiconductor components being arranged on a printed circuit board (25) arranged in a plug-in contact strip (12) of a superordinate circuit carrier (14), the cooling system comprising: means for providing a cooling plate (10), which is mounted in a pivotable manner (Col. 1, line 68) on a plug-in contact strip in a region (see Fig. 3) of one of the power semiconductor components, and which can be pivoted about an axis (38 runs parallel to 12) parallel to the plug-in contact strip, means for (clip using 40) moving the cooling plate means between a first mounting and maintenance position (Fig. 3, shown in phantom) pivoted away from the power semiconductor component (clip using 40), and a second cooling

and operating position (Fig. 3, as shown) pressed onto the power semiconductor component. Frankeny et al. fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

With respect to Claims 11, 19 and 28, Frankeny et al. further teach the cooling plate has cooling fins (54) on the cooling plate side not in contact (see Fig. 5) with the power semiconductor component.

7. Claims 10-11, 18-19 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasufuku et al. (US 6,278,610).

With respect to Claim 10, Yasufuku et al. teach a cooling system for devices comprising power semiconductor components (120), the power semiconductor components being arranged on printed circuit boards (110) arranged in plug-in contact strips (200) of a superordinate circuit carrier (300), the cooling system comprising: a cooling plate (220,230), which is mounted in a pivotable manner (using 221) on a plug-in contact strip in a region (see Fig. 8) of one of the power semiconductor components, and which can be pivoted about an axis (axis of 221) parallel to the plug-in contact strip, the cooling plate having a first mounting and maintenance position (see Fig. 1) pivoted away from the power semiconductor component, and a second cooling and operating position (see Fig. 8) pressed onto the power semiconductor component. Yasufuku et al.

fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

With respect to Claim 18, Yasufuku et al. teach a power semiconductor device having a cooling system comprising: one or more power semiconductor components (120), the power semiconductor components being arranged on a printed circuit board (110) arranged in a plug-in contact strip (200) of a superordinate circuit carrier (300); a cooling plate (220,230), which is mounted in a pivotable manner (using 221) on the plug-in contact strip in a region (see Fig. 8) of one of the power semiconductor components, and configured to be pivoted about an axis (axis of 221) parallel to the plug-in contact strip, the cooling plate having a first mounting and maintenance position (see Fig. 1) pivoted away from the power semiconductor component, and a second cooling and operating position (see Fig. 8) pressed onto the power semiconductor component. Yasufuku et al. fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.



With respect to Claim 27, Yasufuku et al. teach a cooling system for devices comprising power semiconductor components (120), the power semiconductor components being arranged on a printed circuit board (110) arranged in a plug-in contact strip (200) of a superordinate circuit carrier (300), the cooling system comprising: means for providing a cooling plate (220,230), which is mounted in a pivotable manner (using 221) on a plug-in contact strip in a region (see Fig. 8) of one of the power semiconductor components, and which can be pivoted about an axis (axis of 221) parallel to the plug-in contact strip, means for (using 224) moving the cooling plate means between a first mounting and maintenance position (see Fig. 1) pivoted away from the power semiconductor component, and a second cooling and operating position (see Fig. 8) pressed onto the power semiconductor component. Yasufuku et al. fail to disclose a plurality of printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

With respect to Claims 11, 19 and 28, Yasufuku et al. further teach the cooling plate has cooling fins (230 fins) on the cooling plate side not in contact (see Fig. 7) with the power semiconductor component.

8. Claims 12-13, 20-21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087) in view of Kawamura (US 6,424,532).

Frankeny et al. disclose the claimed invention except for the cooling grid structures fitted on its edges. Kawamura teaches the cooling plate (5B) has cooling grid structures (5D) fitted on its edge sides (over both sides of 5B) (claims 12, 20 and 29) and the cooling grid structures cover the remaining adjacent semiconductor components (3 on edges sides of 1) of a printed circuit board (claims 13 and 21). It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. with the cooling grids of Kawamura to increase the surface area for greater heat dissipation of the power semiconductor components.

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087) in view of Kawamura (US 6,424,532) as applied to the above claims, and further in view of Hsueh (US 6,775,139).

Frankeny et al. in view of Kawamura disclose the claimed invention except for a cooling grid structure is arranged at an upper edge side of the cooling plate and projects beyond an upper edge of the printed circuit board. Hsueh teaches a cooling grid structure (114) is arranged at an upper edge side (above 111) of the cooling plate (111) and projects beyond an upper edge of the printed circuit board (3) and into a cooling air stream (air from 22). It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. in view of Kawamura with the cooling grid structure of Hsueh to increase the surface area of the cooling system for greater heat dissipation of the power semiconductor components.

9. Claims 15 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087) in view of Konstad et al. (US 6,130,820).

Frankeny et al. disclose the claimed invention except for a cooling air stream parallel to the plug-in contact strips. Konstad et al. teach a cooling air stream device (103) that generates a cooling air stream is arranged in such a way that it has a forced cooling parallel (see Fig. 1) to the plug-in contact strips (102) of the device (101) to be cooled. It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. with the cooling air stream device of Konstad et al. to increase the airflow for greater heat dissipation of the power semiconductor components.

10. Claims 16-17 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087) in view of Hsueh (US 6,775,139).

With respect to Claims 16 and 24, Frankeny et al. disclose the claimed invention except for a cooling grid structure is arranged at an upper edge side of the cooling plate and projects beyond an upper edge of the printed circuit board. Hsueh teaches a cooling air stream device (22) that generates a cooling air stream is arranged in such a way that it has a forced cooling perpendicular to (22 flows air down on 7) the plug-in contact strips (7) of the device to be cooled, into which with cooling grid structures (114) connected to the cooling plate (111) projects. It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. with the cooling grid structure of Hsueh to increase the surface area of the cooling system for greater heat dissipation of the power semiconductor components.

With respect to Claims 17 and 25, Frankeny et al. disclose the claimed invention except for two cooling plates which are opposite one another. Hsueh teaches two

cooling plates (111) which are opposite one another (on either side of 3) and which are arranged on a plug-in contact strip (7) in the region of a power semiconductor (32) component. It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. with the cooling plates of Hsueh to cool components that are on opposing sides of the printed circuit board for greater density of the power semiconductor components on the printed circuit board.

11. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Frankeny et al. (US 5,161,087) in view of Hsueh (US 6,775,139) and further in view of Le et al. (US 5,680,295).

Frankeny et al. teach a method for cooling a device having power semiconductor components (24), the method comprising: mounting pivotable (Col. 1, line 68) cooling plates (10) onto a plug-in contact strip (12) in the regions of power semiconductor components in a first mounting and maintenance position (Fig. 3, shown in phantom); fitting printed circuit boards with power semiconductor components on the plug-in contact strips (plugging 20 into 12) and pivoting the cooling plate about an axis (38 runs parallel to 12) parallel to the plug-in contact strip into a second cooling or operating position (Fig. 3, as shown), in which the cooling plate bears on (10 against 24) the power semiconductor component. Frankeny et al. fail to disclose a plurality of cooling plates, a plurality of printed circuit boards, a plurality of plug-in contact strips and a cooling stream. Hsueh teaches a plurality of cooling plates (111), a plurality of printed circuit boards (3), a plurality of plug-in contact strips (7) and orienting a device (22) generating a cooling air stream (Fig. 8, arrows), such that the cooling air stream flows

perpendicular (see Fig. 8) to the plug-in contact strips (7); and providing the cooling air stream during operation of the power semiconductor components (31). It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. with the cooling air stream and plurality of cooling plates, printed circuit boards and plug-in contact strips of Hsueh to increase the airflow for greater heat dissipation and duplicate the cooling plates, printed circuit boards and plug-in contact strips for greater computing capacity of the device. Frankeny et al. in view of Hsueh fail to disclose the cooling air stream during operation of the power semiconductor components in the event of a critical temperature of the power semiconductor components being reached. Le et al. teach the cooling air stream (64) during operation of the power semiconductor components in the event of a critical temperature of the power semiconductor components being reached (Col. 5, lines 44-46). It would be obvious to one of ordinary skill in the art at the time of the invention to modify the cooling system of Frankeny et al. in view of Hsueh with the cooling air stream of Le et al. to operate the fan only when the critical temperature is reached for quieter operation of the device before the critical temperature is reached.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Stewart et al. (US 7,187,552) discloses a pivotable cooling plates for a power semiconductor components being arranged on a printed circuit boards arranged in plug-in contact strips of a superordinate circuit carrier having a maintenance

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position away from the power semiconductor component and an operating position pressed against the power semiconductor position.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash Gandhi can be reached on (571) 272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJH 5/13/08

/Robert J. Hoffberg/  
Examiner, Art Unit 2835

/Jayprakash N Gandhi/  
Supervisory Patent Examiner, Art Unit 2835